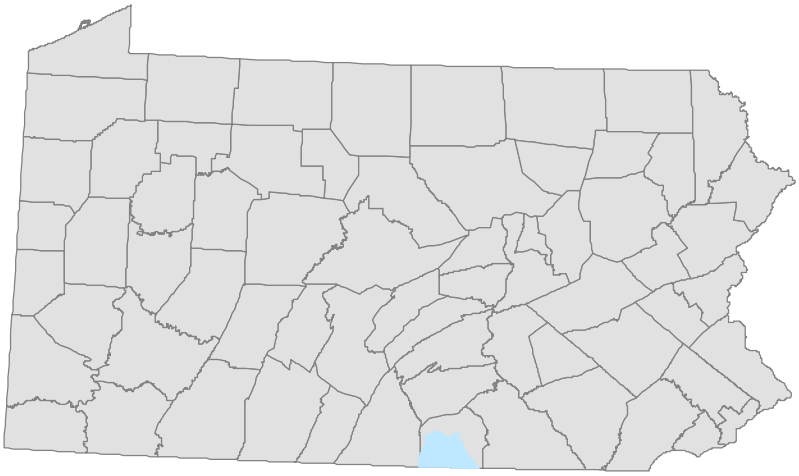


Rapid Watershed Assessment

Monocacy Watershed

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best actions to achieve their goals.

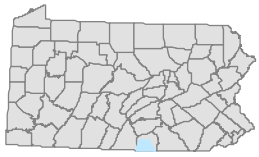
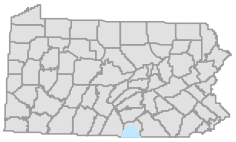


Table of Contents



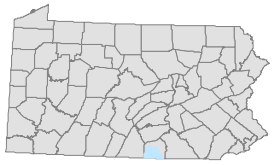
Preface

The Natural Resources Conservation Service (NRCS) is initiating rapid watershed assessments in order to increase the speed and efficiency generating resource information to guide conservation implementation, as well as the speed and efficiency of putting it into the hands of local decision makers. While these rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide a foundation for watershed studies or area planning. In addition, the assessments provide the benefits of NRCS locally-led planning for resource conservation and conservation program implementation in less time and at a reduced cost than more complex studies.

Rapid watershed assessments will be valuable for Farm Bill program delivery, and provide useful information for county, watershed and regional planners. These assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments can help landowners and local leaders set priorities and determine the best actions to achieve their goals.

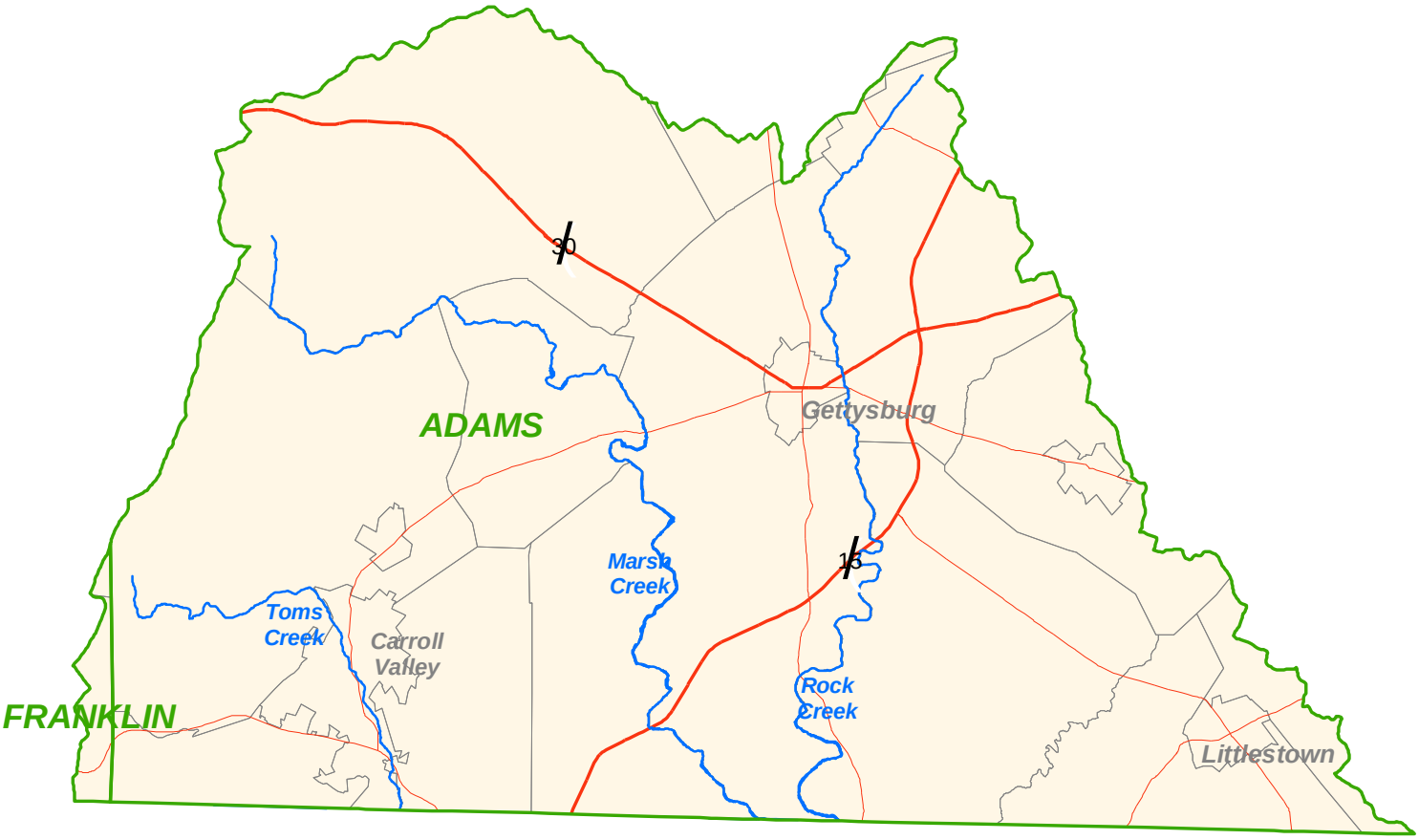
To produce the assessments, quantitative and qualitative data is collected and organized to create a watershed profile using Geographic Information System (GIS) technology. The data is analyzed to allow resource concerns and conditions to become apparent, and to generate maps and information to help people make better decisions about conservation needs and programs.

/s/ Craig R. Derickson
Pennsylvania State Conservationist

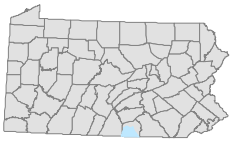


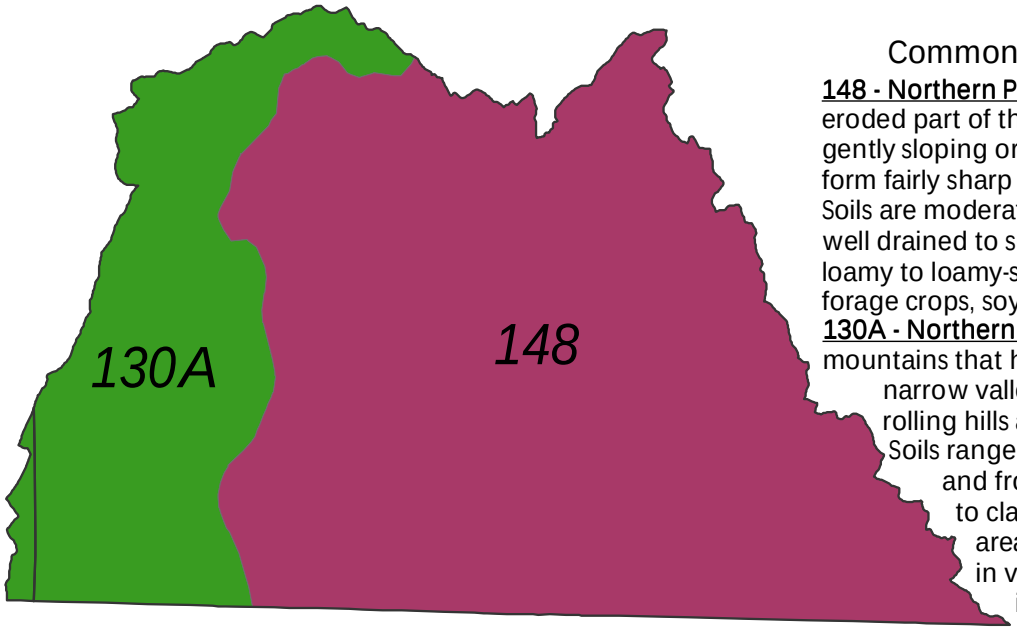
Introduction

The Monocacy Watershed is located in South Central Pennsylvania in parts of Adams and Franklin Counties. The area of the watershed in Pennsylvania is almost 145,700 acres in size, of which slightly over 85,600 acres is farmland. Two Service Centers of the Natural Resources Conservation Service, two county Conservation Districts and the Capital Resource Conservation and Development Council office provide conservation assistance in this watershed.



	Acres in HUC	% Acres of HUC
Adams	144,424	99.1
Franklin	1,247	.9





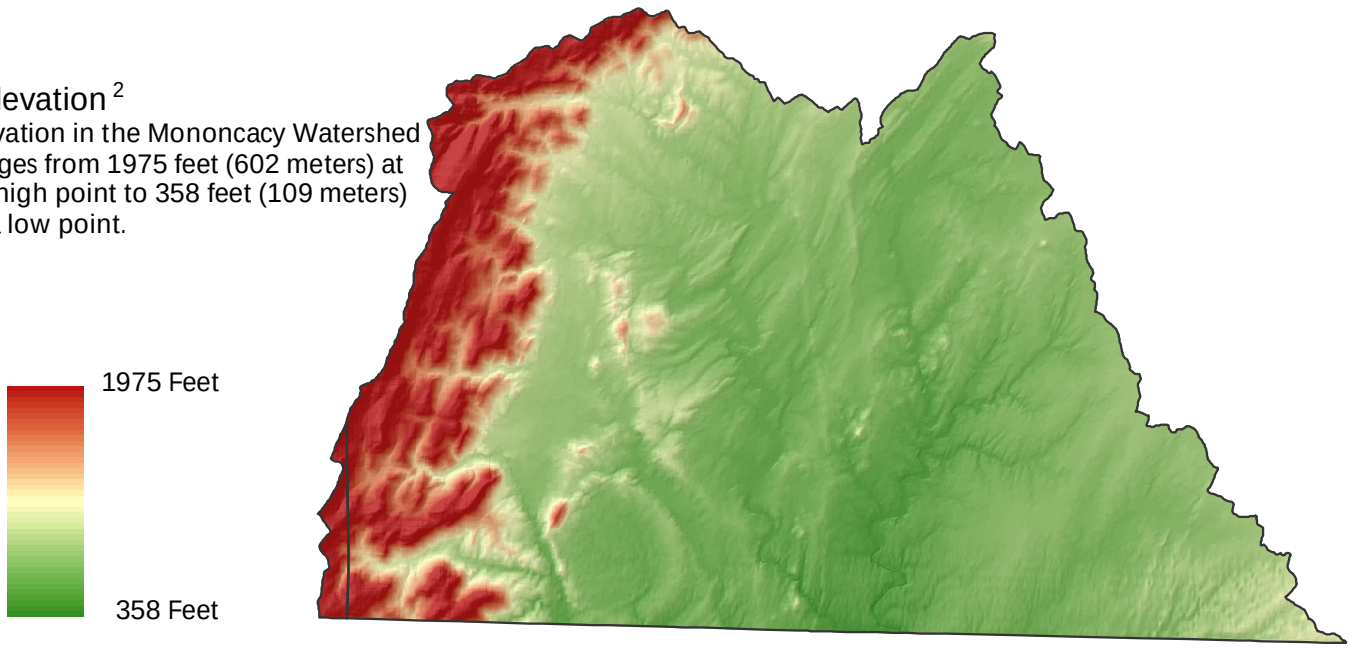
Common Resource Area (CRA)[1]

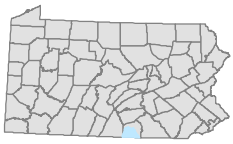
148 - Northern Piedmont: Most of the CRA is an eroded part of the Piedmont Plateau. It is mostly gently sloping or sloping. Intrusive dikes and sills form fairly sharp ridges within the less steep terrain. Soils are moderately deep to very deep, moderately well drained to somewhat excessively drained, and loamy to loamy-skeletal. Farms are mostly crops, forage crops, soybeans, and grain for diary cattle.

130A - Northern Blue Ridge: This CRA has rugged mountains that have steep slopes, sharp crests, narrow valleys. Broad valleys and basins and rolling hills are extensive throughout the area. Soils range from moderately deep to very deep and from loamy-skeletal and sandy-skeletal to clayey. Only about one-tenth of the area is cropland mainly on small farms in valleys and coves, and about one-sixth is pasture.

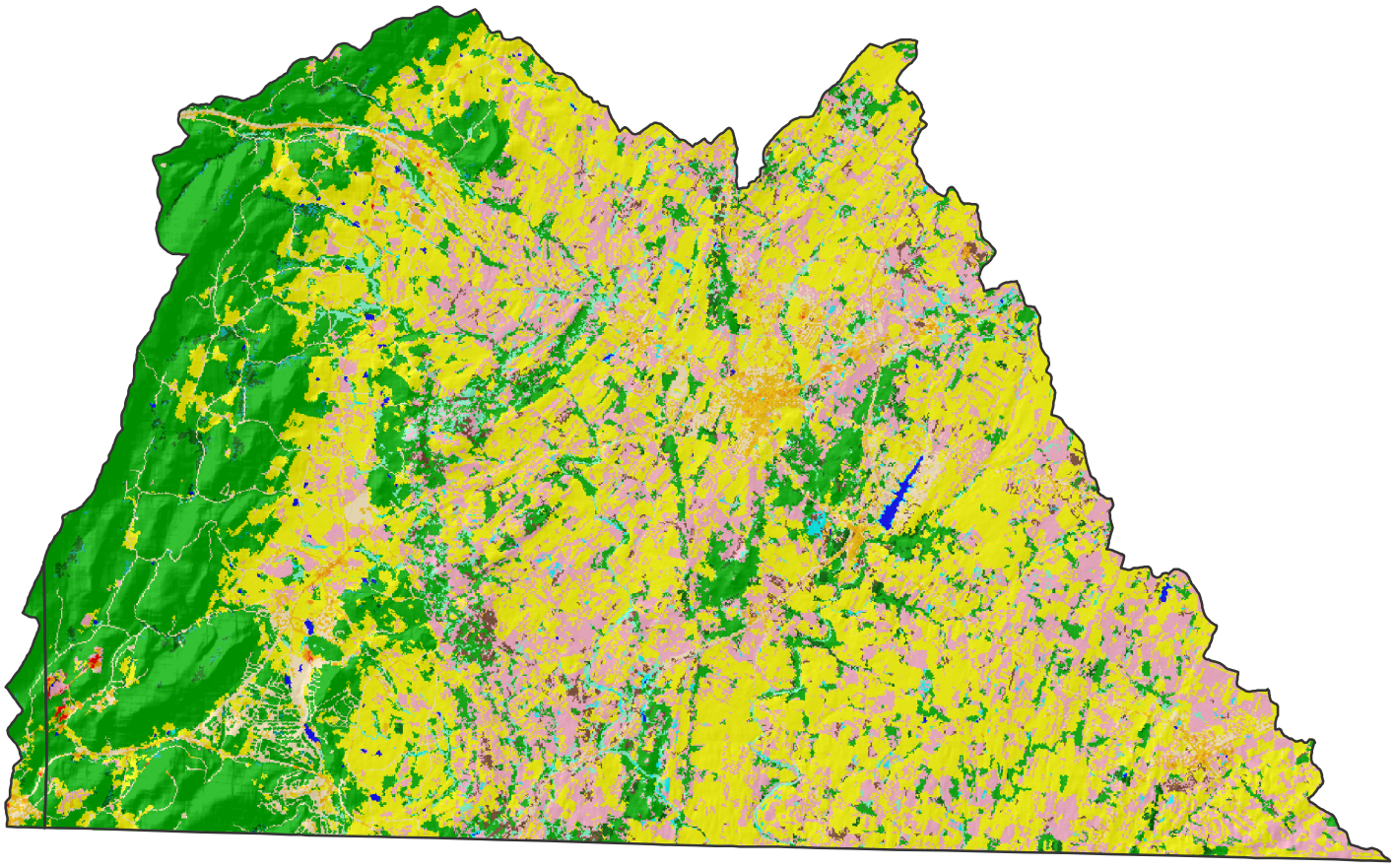
Elevation [2]

Elevation in the Mononcacy Watershed ranges from 1975 feet (602 meters) at it's high point to 358 feet (109 meters) at a low point.

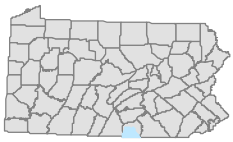




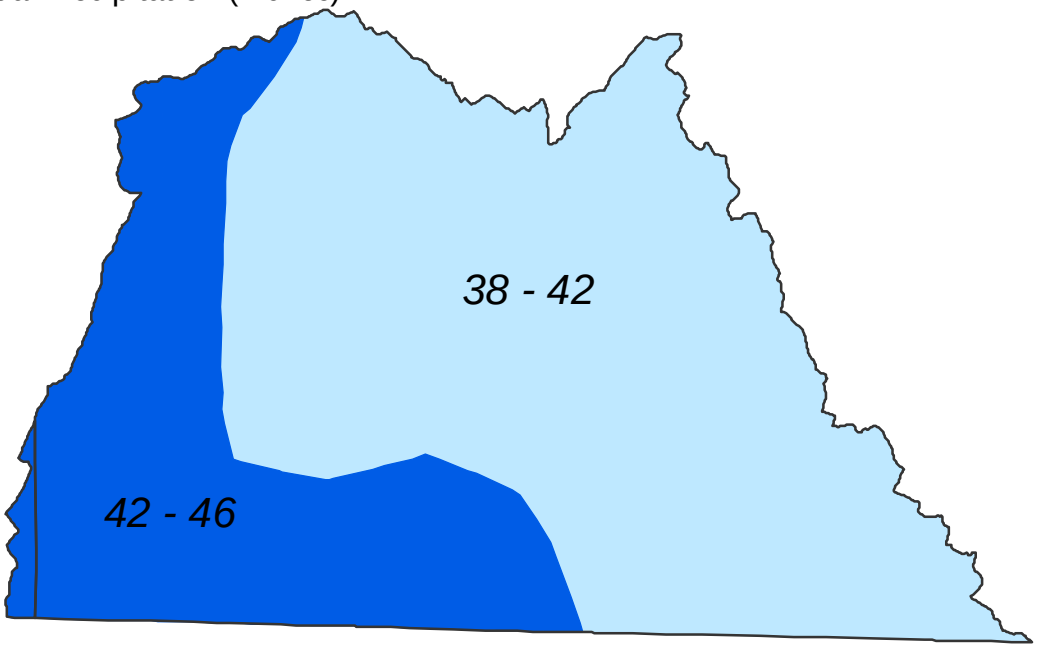
Land Use / Land Cover 2001[3]



	Acres	Percent
Water	363.7	.2
Developed, Open Space	6863.9	4.7
Developed, Low Intensity	3346.8	2.3
Developed, Medium Intensity	284.5	.2
Developed, High Intensity	50.5	-
Barren Land (Rock/Sand/Clay)	2255.1	1.5
Deciduous Forest	40,044.8	27.5
Evergreen Forest	2061.6	1.4
Mixed Forest	371.2	.3
Pasture/Hay	55,173.0	37.9
Cultivated Crops	30,457.3	20.9
Woody Wetlands	3592.9	2.5
Emergent Herbaceous Wetlands	812.3	.6



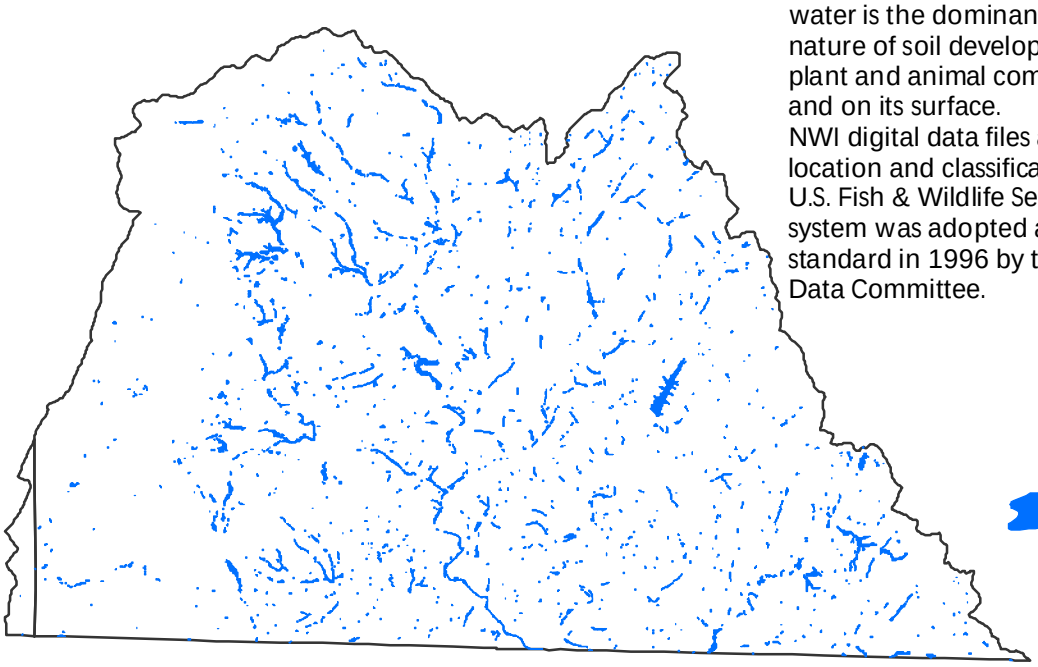
Average Annual Precipitation (Inches)[4]



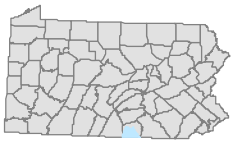
National Wetlands Inventory[5]

Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface.

NWI digital data files are records of wetlands location and classification as developed by the U.S. Fish & Wildlife Service. The classification system was adopted as a national classification standard in 1996 by the Federal Geographic Data Committee.



National Wetlands Inventory

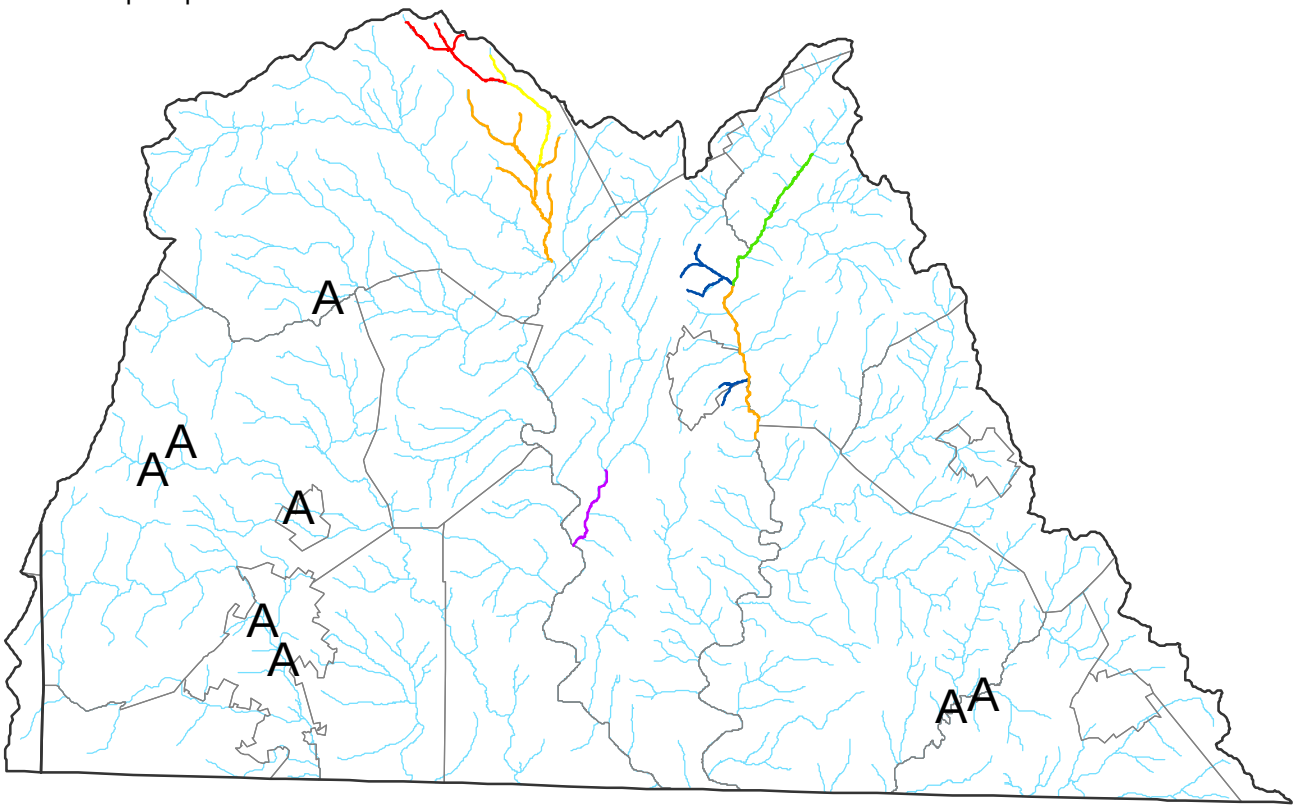


Impaired Streams[6]

The Streams Integrated List represents stream assessments in an integrated format for the Clean Water Act Section 305(b) reporting and Section 303(d) listing. PA Department of Environmental Protection protects 4 stream water uses: aquatic life, fish consumption, potable water supply, and recreation. The 305(b) layers represents stream segments that have been evaluated for attainment of those uses and determine which streams are non-attaining.

Water Quality Tesing Points[7]

The water quality testing points are locations at which the water quality is monitored by volunteers. A database of these points contains information on water quality from 1986 to the present from 622 testing sites throughout Pennsylvania. Information in records includes at least alkalinity and pH and includes nitrates and phosphates for some sites since 1996.



Causes of Agriculturally Impaired Streams:

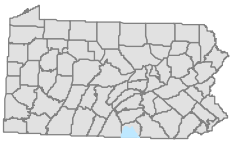
- Nutrients
- Nutrients and Siltation
- Nutrients and Unknown Toxicity
- Nutrients, Siltation, Water Flow Variability, and Thermal Modifications
- Siltation
- Siltation, Organic Enrichment/Low Dissolved Oxygen and Other Habitat Alterations

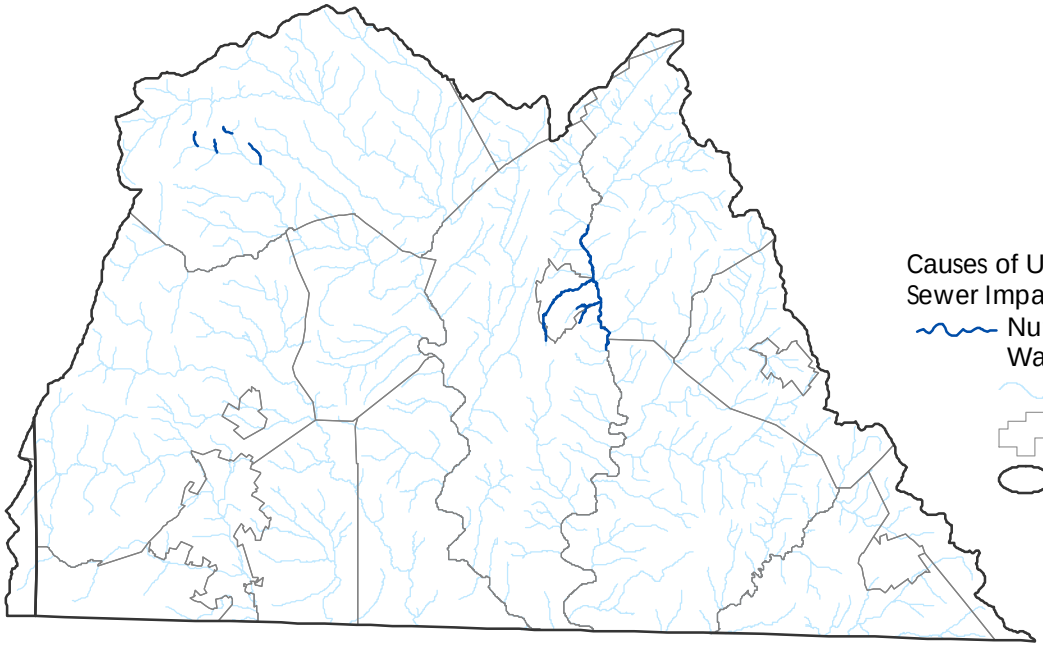
A Water Quality Testing Points

Streams

Townships

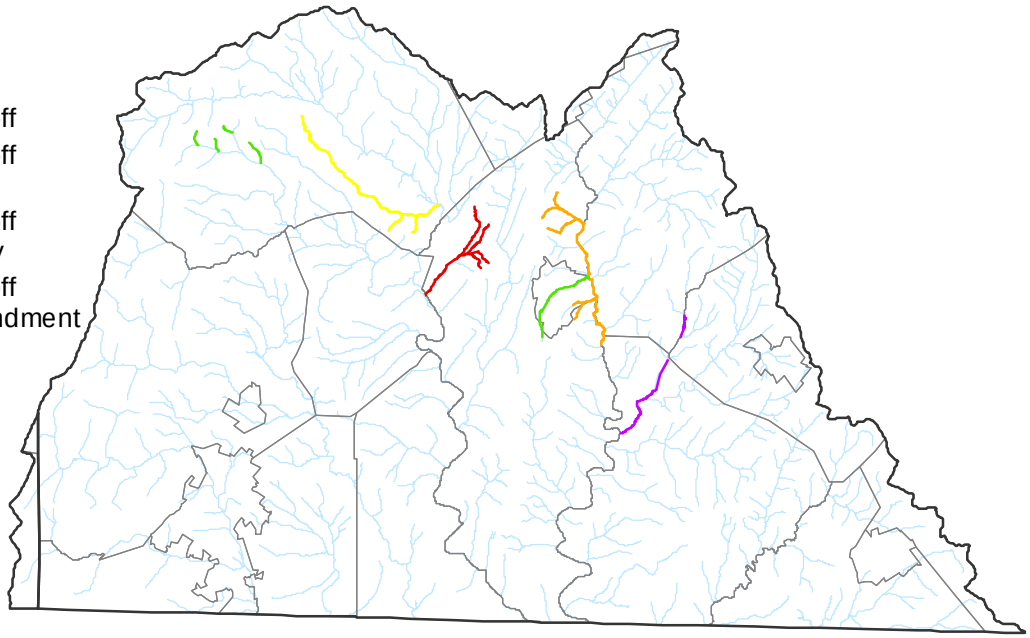
County Boundary

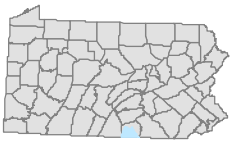




Causes of Urban Runoff/Storm Sewer Impaired Streams:
- Nutrients, Siltation, and Water Flow Variability
- Streams
- Townships
- County Boundary

Other Sources of Impairment:
- Land Development
- Small Residential Runoff
- Small Residential Runoff and Road Runoff
- Small Residential Runoff and Unknown Toxicity
- Small Residential Runoff and Upstream Impoundment
- Streams
- Townships
- County Boundary

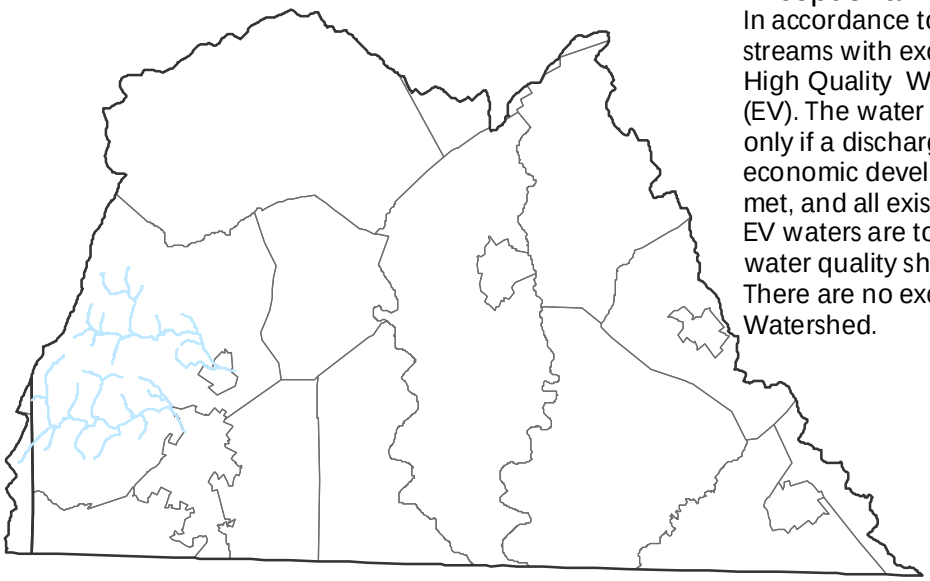




Exceptional Value and High Quality Streams[8]

In accordance to Chapter 93 of Pennsylvania Code, streams with excellent water quality may be designated High Quality Waters (HQ) or Exceptional Value Waters (EV). The water quality in an HQ stream can be lowered only if a discharge is the result of necessary social or economic development, the water quality criteria are met, and all existing uses of the stream are protected. EV waters are to be protected at their existing quality; water quality shall not be lowered.

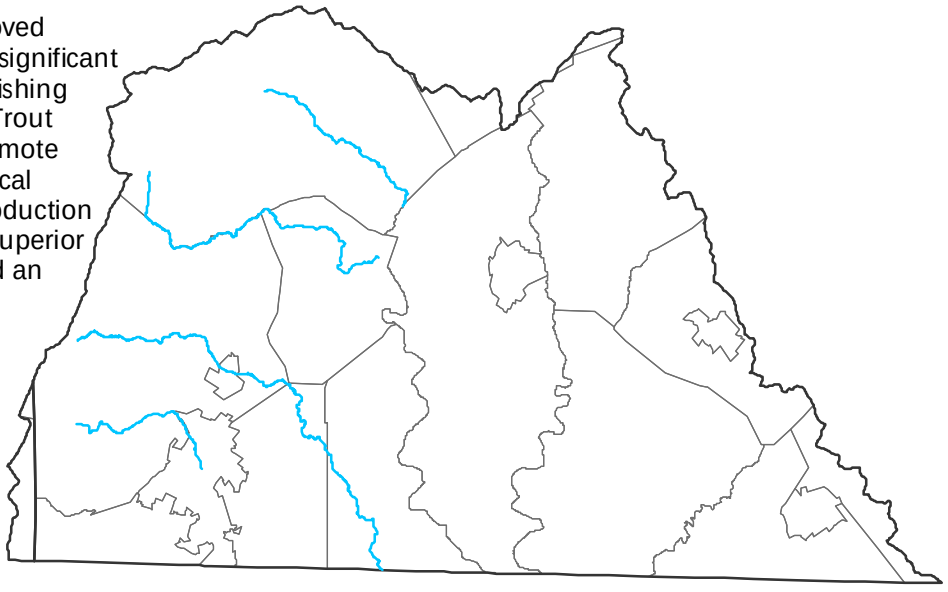
There are no exceptional value streams in the Monocacy Watershed.



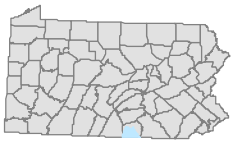
High Quality Streams
Townships
County Boundary

Pennsylvania Trout Waters[9]

Approved Trout Waterbodies and Approved Trout Streams are waters which contain significant portions that are open to the public for fishing and are stocked with trout. Wilderness Trout Streams are designed to protect and promote native (brook trout) fisheries, the ecological requirements necessary for natural reproduction of trout and wilderness aesthetics. The superior quality of these watersheds is considered an important part of the overall angling experience on wilderness trout streams.



Approved Trout Streams
Townships
County Boundary



Water Resource Points [10]

A Water Resource is a DEP primary facility type related to the Water Use Planning Program. The sub-facility types related to Water Resources that are included are:

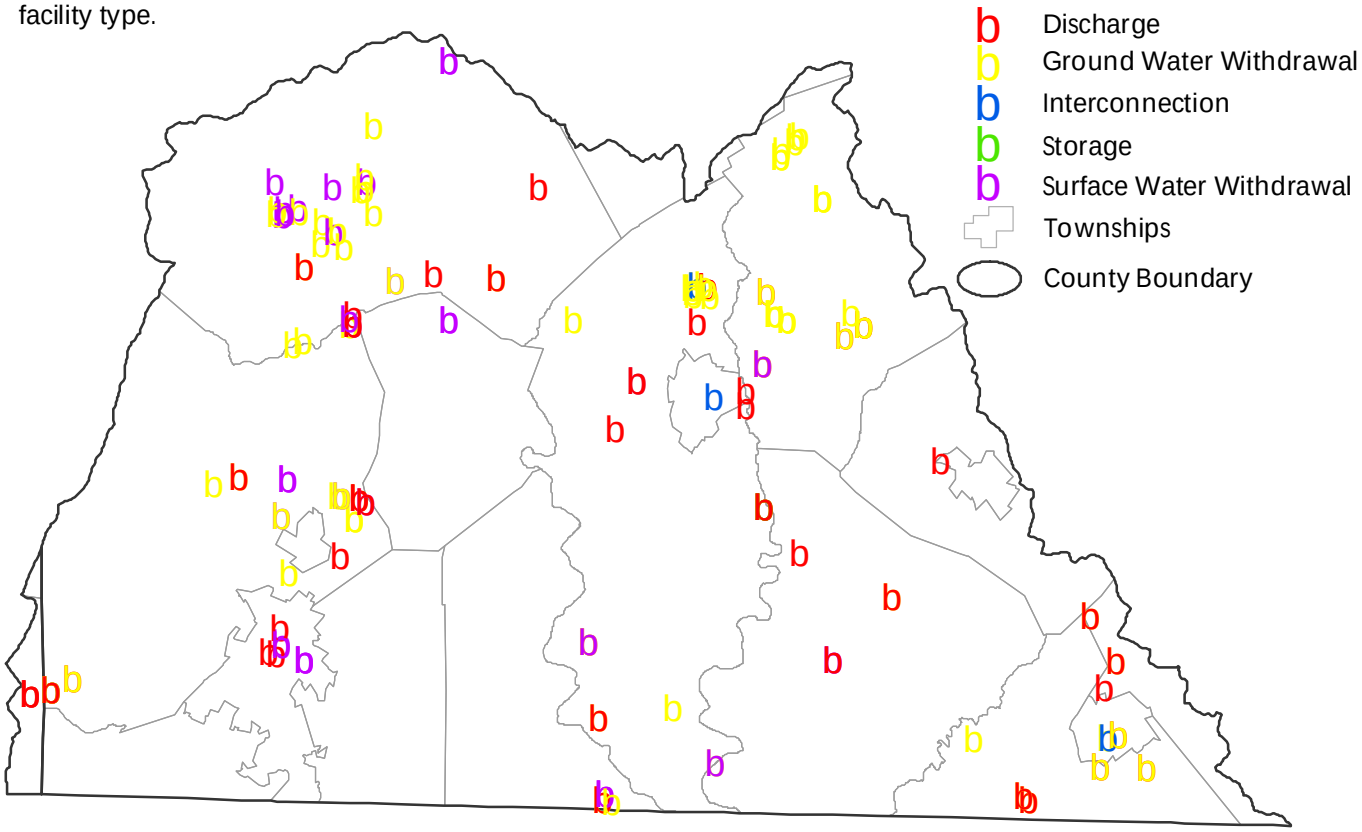
Discharge: represents the return of water used at a Water Resources primary facility. The subfacility type may be a sewage treatment plant, instream discharge, spray irrigation field, groundwater recharge, on-lot septic or an unidentified facility type.

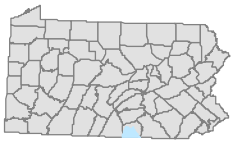
Ground Water Withdrawal: represents the withdrawal of water used at a Water Resources primary facility. The subfacility type may be a well, spring, quarry, infiltration gallery, deep mine, surface mine or an unidentified facility type.

Interconnection: represents the point of interconnection between Water Resources primary facilities. The subfacility type may be for an interconnection between two public water supply agencies or between a public water supply agency and a commercial or industrial water user.

Storage: represents the storage of water used at a Water Resources primary facility. The subfacility type represents raw or treated water storage and may be a quarry, standpipe, open off-stream reservoir, closed off-stream reservoir, instream reservoir, hydroelectric dam, natural lake, pond,silt dam, hydroelectric pumped storage or an unidentified facility type.

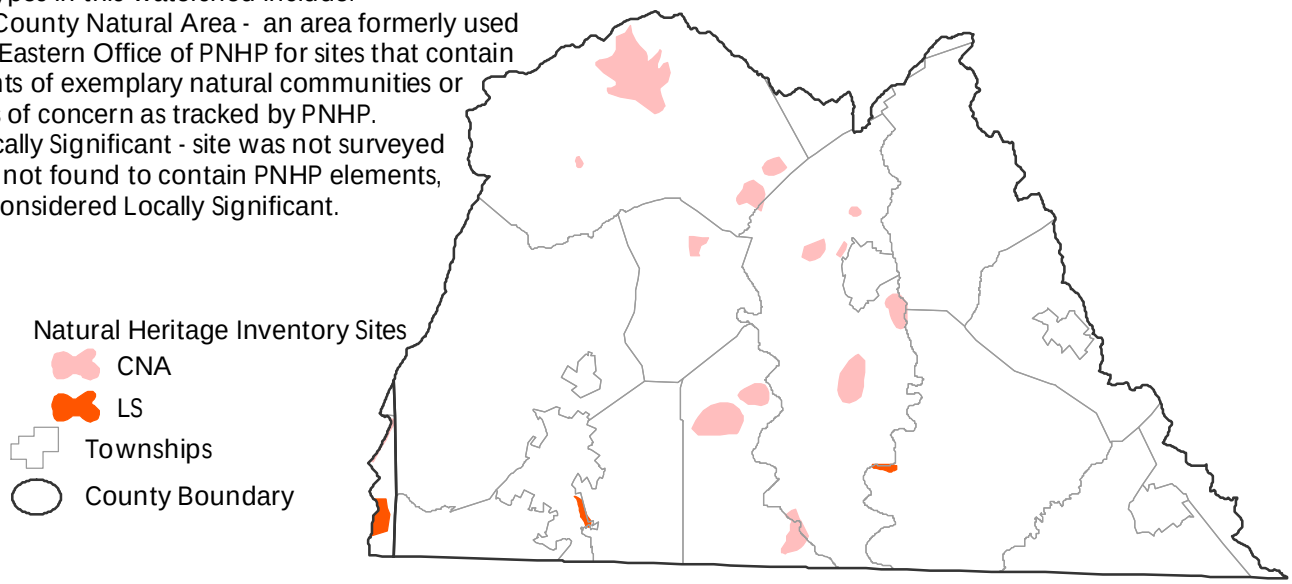
Surface Water Withdrawal: represents the withdrawal of water used at a Water Resources primary facility. The subfacility type may be an instream diversion, intake from a dam, natural lake, pond, river well, or an unidentified facility type.





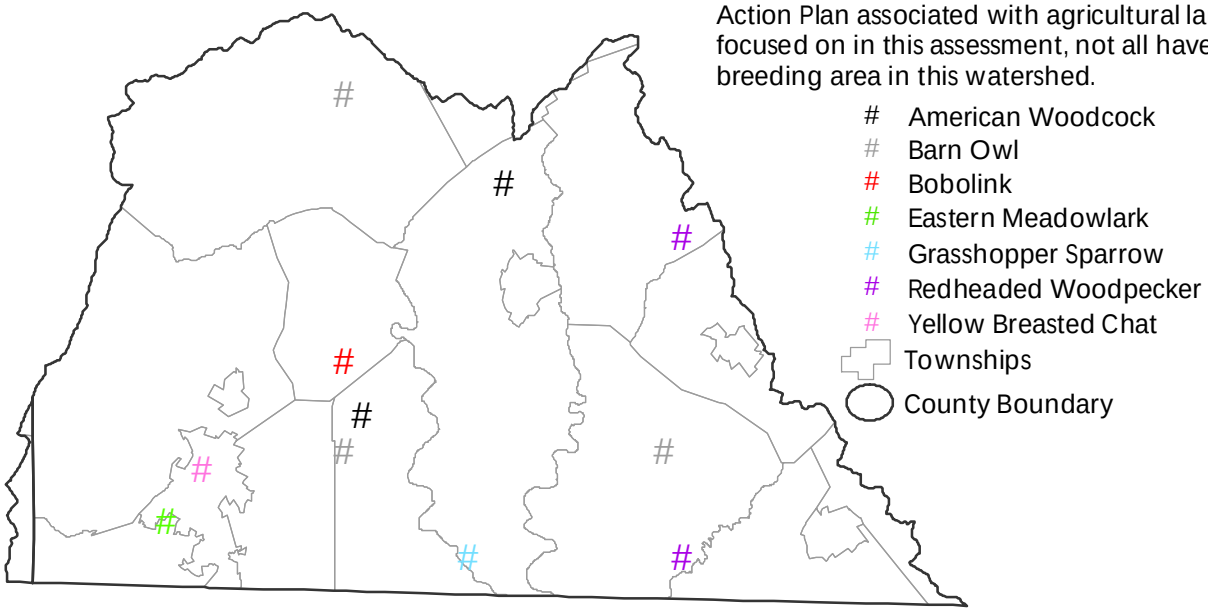
Natural Heritage Inventory Sites[11]

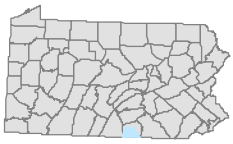
These areas are intended to identify outstanding floral, faunal, and geologic features, including natural communities (habitats) and locations of animal and plant species of special concern (endangered, threatened, or rare).
Area Types in this watershed include:
CNA - County Natural Area - an area formerly used by the Eastern Office of PNHP for sites that contain elements of exemplary natural communities or species of concern as tracked by PNHP.
LS - Locally Significant - site was not surveyed or was not found to contain PNHP elements, but is considered Locally Significant.



Pennsylvania Breeding Bird Atlas[12]

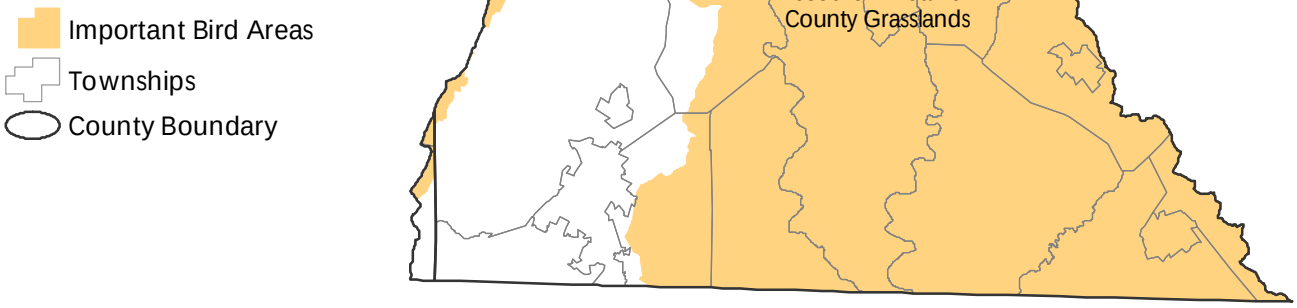
The 1st Pennsylvania Breeding Bird Atlas (1992) assesses the distribution of breeding birds across the state. The areas below are confirmed breeding areas for species. Fourteen birds species from Pennsylvania's state Wildlife Action Plan associated with agricultural landscapes were focused on in this assessment, not all have confirmed breeding area in this watershed.





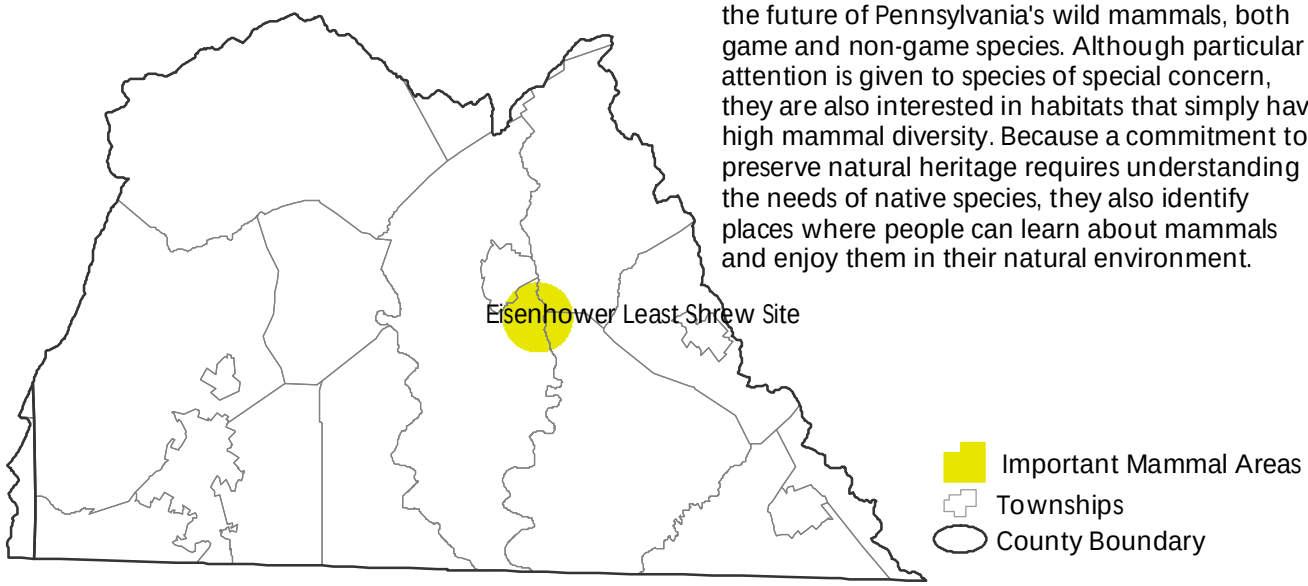
Important Bird Areas[13]

Important Bird Areas (IBA) are sites that provide essential habitat for one or more species of bird. IBAs include sites for breeding, wintering, and/or migrating birds. IBAs may be a few acres or thousands of acres, but usually they are discrete sites that stand out from the surrounding landscape. IBAs may include public or private lands, or both, and they may be protected or unprotected.

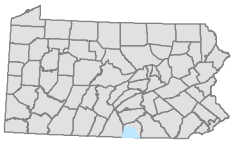


Important Mammal Areas[14]

The Important Mammal Areas Project is being carried out by a broad based alliance of sportsmen, conservation organizations, wildlife professionals, and scientists. The primary concern is to help ensure the future of Pennsylvania's wild mammals, both game and non-game species. Although particular attention is given to species of special concern, they are also interested in habitats that simply have high mammal diversity. Because a commitment to preserve natural heritage requires understanding the needs of native species, they also identify places where people can learn about mammals and enjoy them in their natural environment.

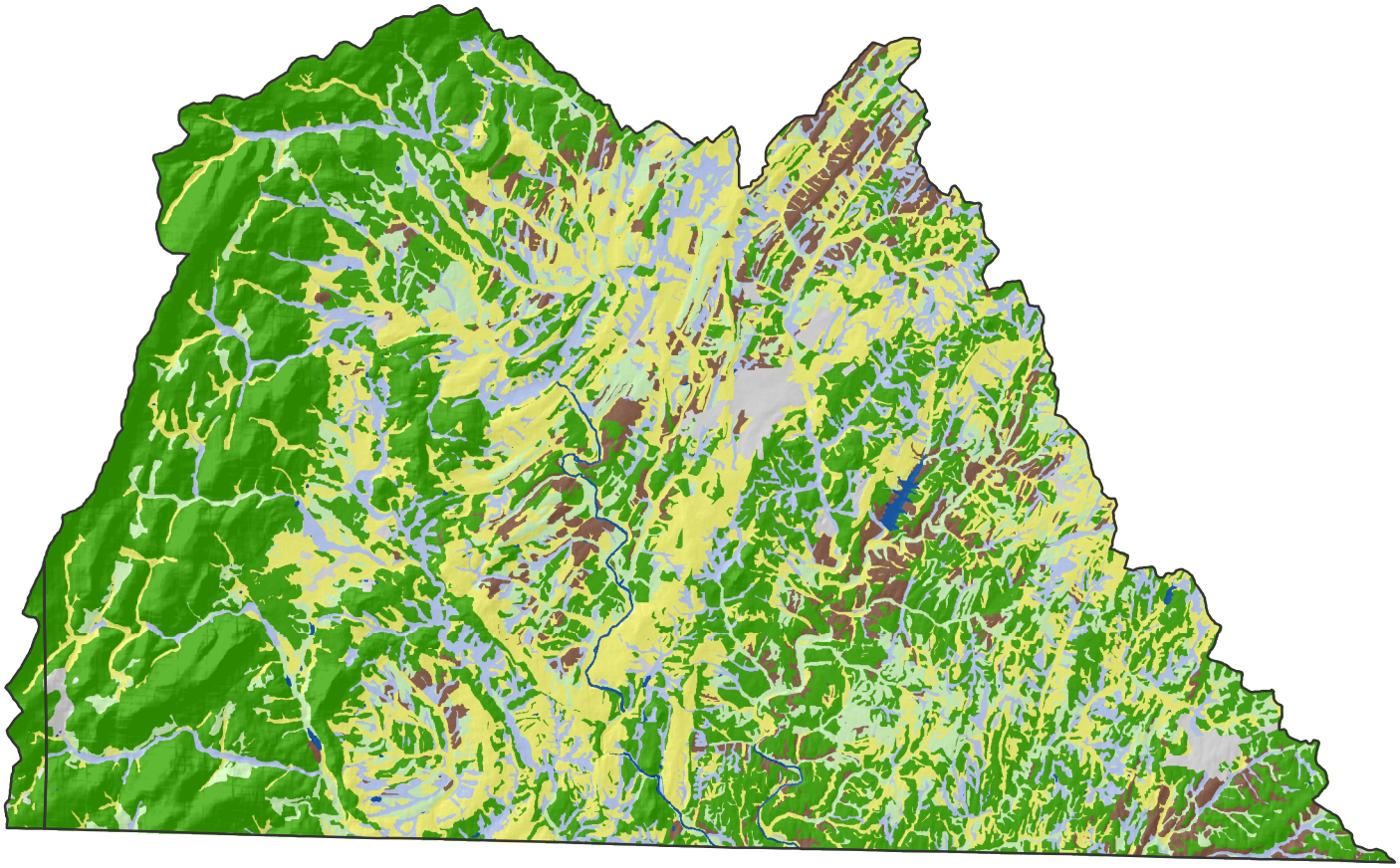


Soils[15]



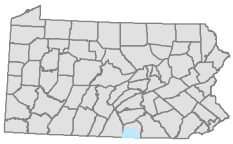
Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized -- excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."



Drainage Classification

	% Area
Excessively - Somewhat excessively drained	6.1
Well drained	46.2
Moderately well drained	11.2
Somewhat poorly drained	23.6
Poorly -Very poorly drained	10.9
Water	.5
Unclassified	1.5
County Boundary	

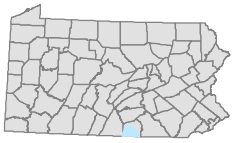


Farmland Classification

Farmland classification identifies soil map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No. 21, January 31, 1978.

Farmland Classification

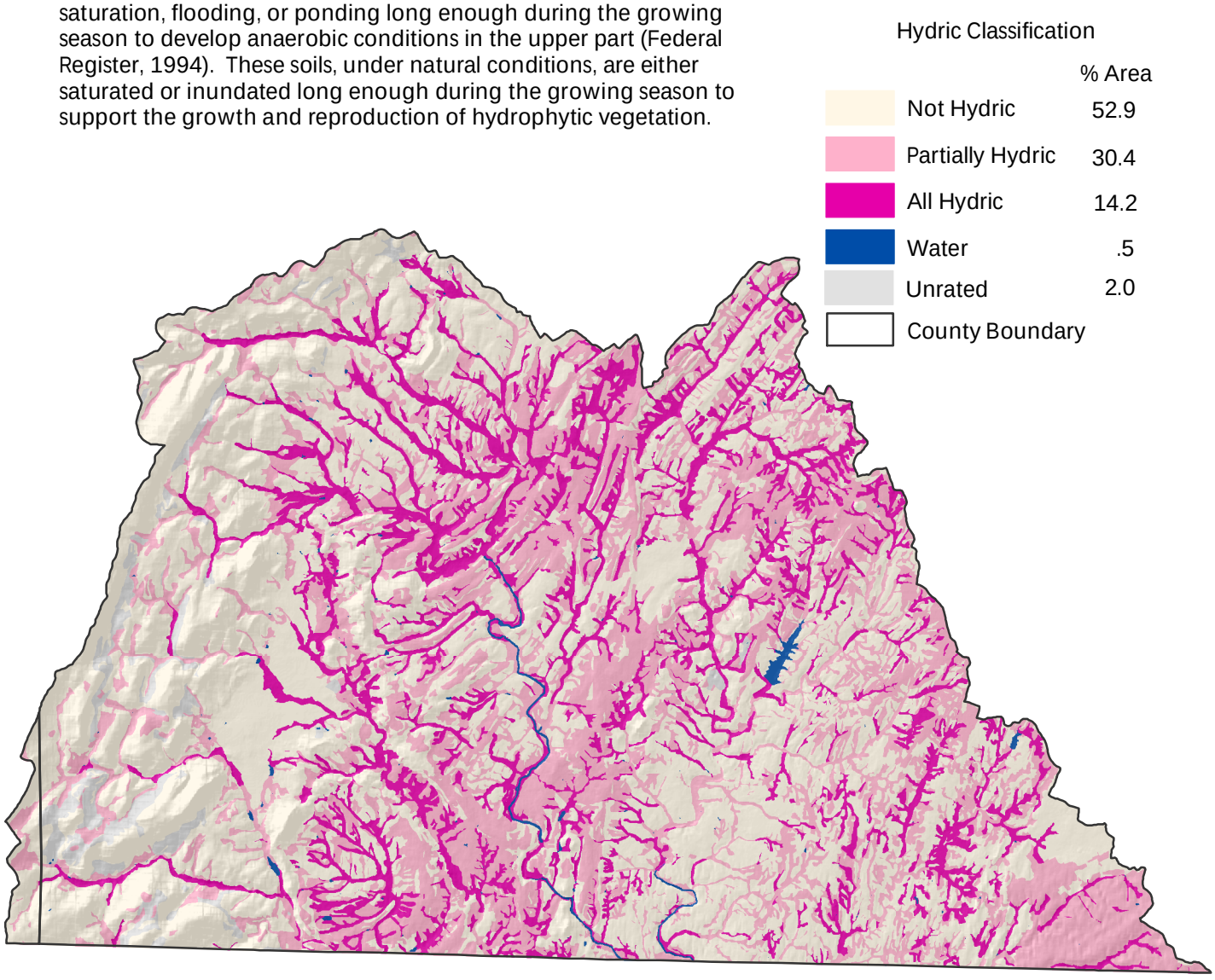
	% Area
All areas are prime farmland	29.6
Farmland of statewide importance	26.6
Not prime farmland or statewide importance	43.8
County Boundary	

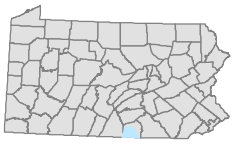


Hydric Soil Classification

This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

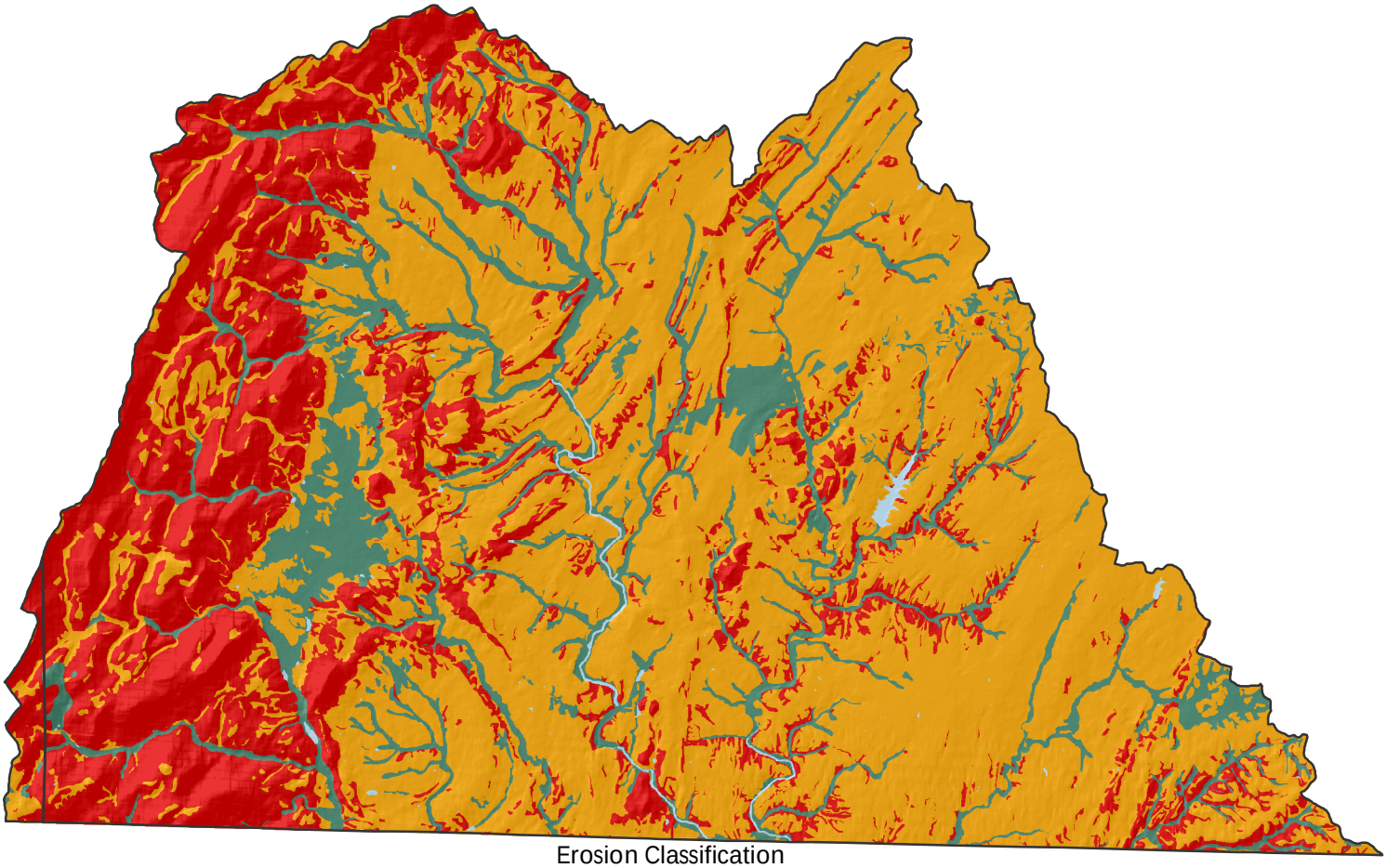
Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.



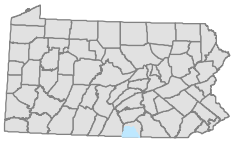


Highly Erodible Land

A soil map with an erodibilty index (EI) of 8 or greater is considered to be highly erodible land (HEL). The EI for a soil map unit is determined by dividing the potential erodibility for the soil map unit by the soil loss tolerance (T) value established for the soil in the FOTG as of January 1, 1990. Potential erodibility is based on default values for rainfall amount and intensity, percent and length of slope, surface texture and organic matter, permeability, and plant cover. Actual erodibility and EI for any specific map unit depends on the actual values for these properties.

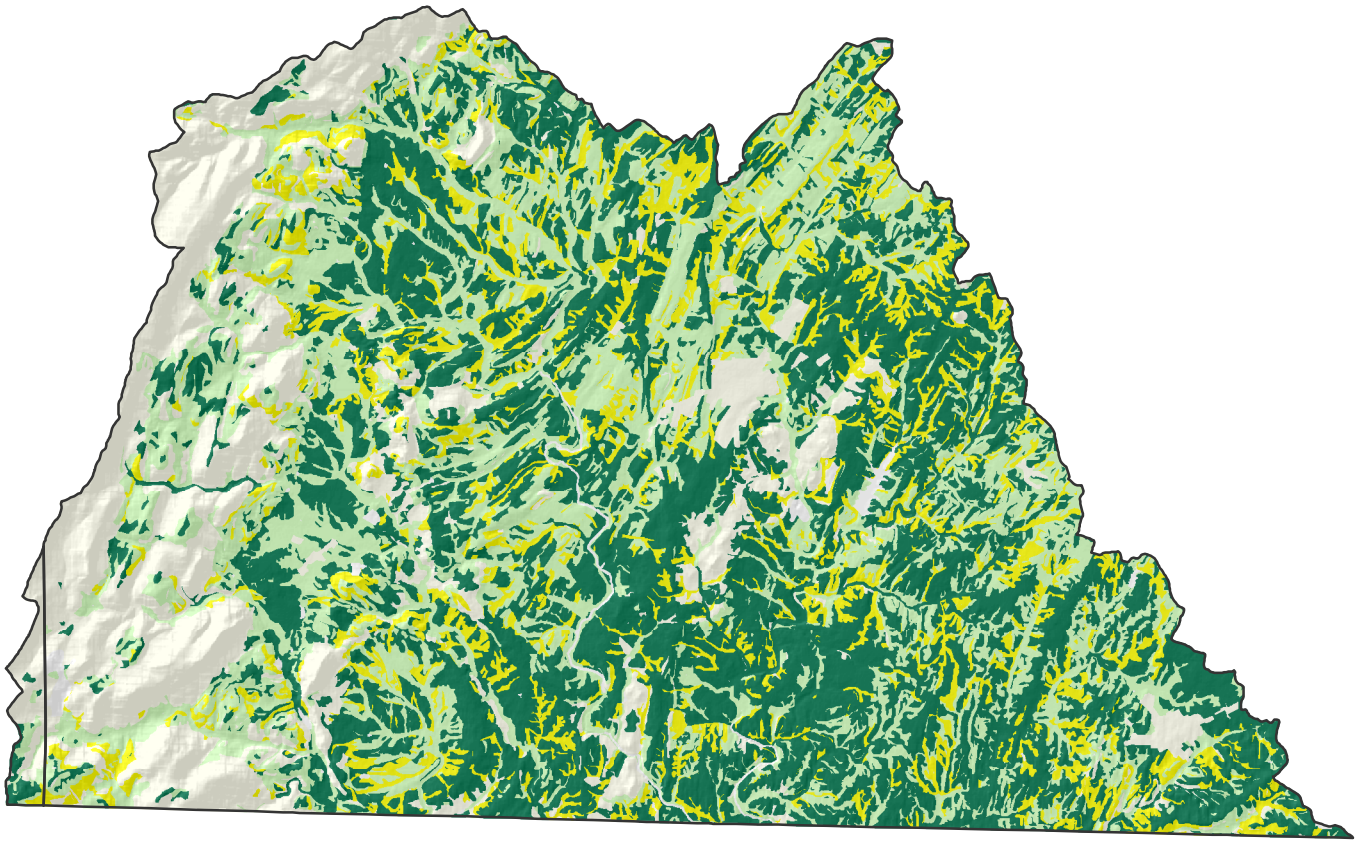


Erosion Classification	% Area
Not highly erodible land	11.1
Potentially highly erodible land	60.2
Highly erodible land	28.2
Water	.5
County Boundary	

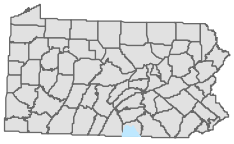


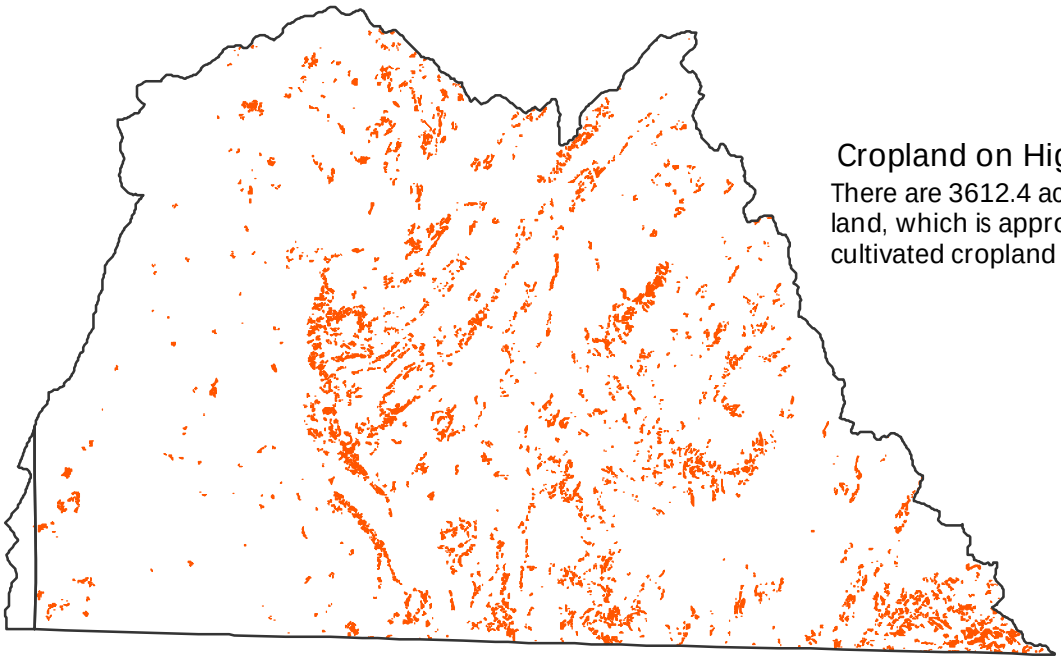
Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.



Land Capability Classification	% Area
Well Suited (Capability Class 1 -2)	39.7
Moderately well suited (Capability Class 3)	27.9
Poorly suited (Capability Class 4 -5)	13.0
Unsuited (Capability Class 6 - 8)	18.6
Unclassified	.8
County Boundary	



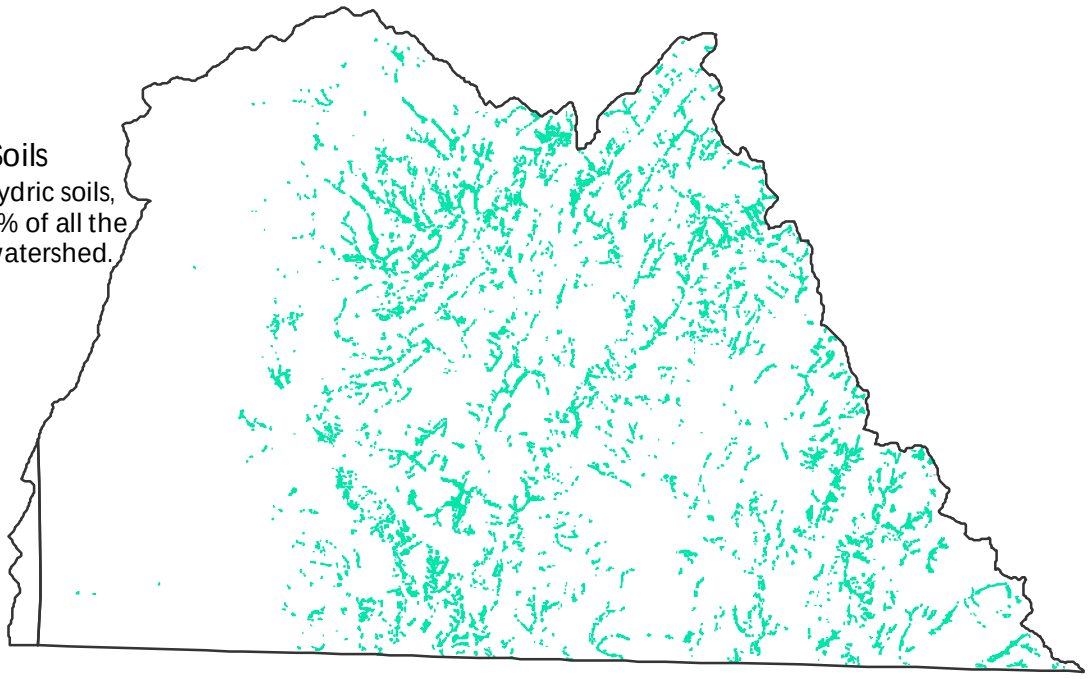


Cropland on Highly Erodible Land

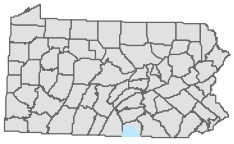
There are 3612.4 acres on highly erodible land, which is approximately 11.9% of all the cultivated cropland in the watershed.

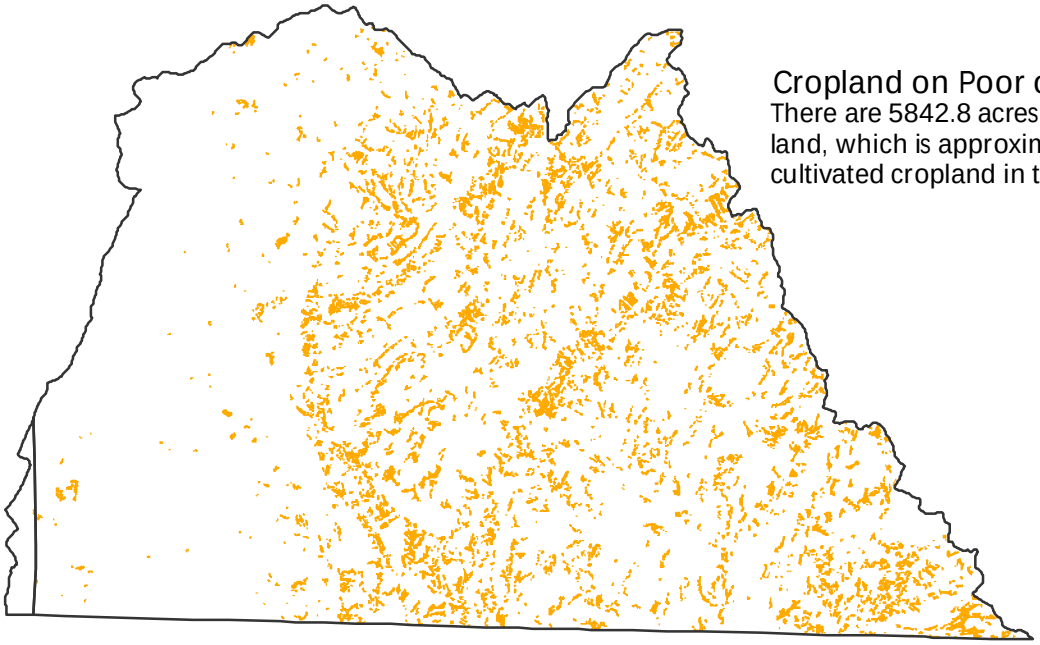
Cropland on Hydric Soils

There are 4972.5 acres on hydric soils, which is approximately 16.3% of all the cultivated cropland in the watershed.



Monocacy Watershed

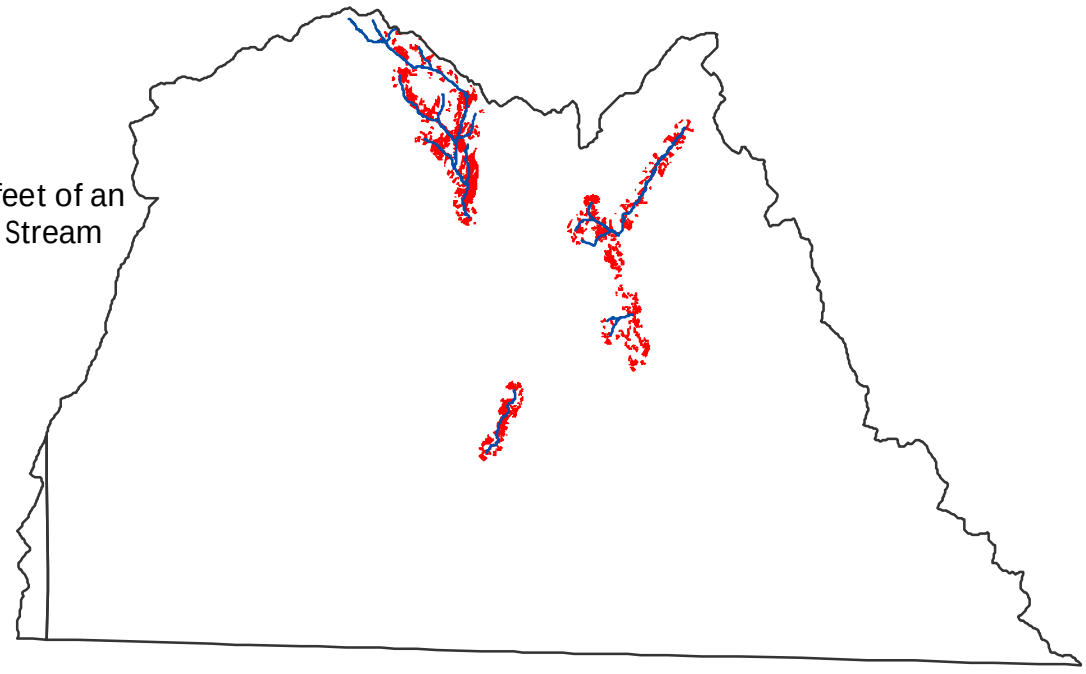


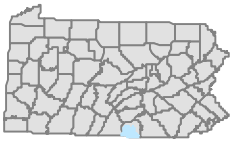


Cropland on Poor or Unsuited Soil

There are 5842.8 acres on poor or unsuited land, which is approximately 19.2% of all the cultivated cropland in the watershed.

Cropland within 1000 feet of an Agricultural Impaired Stream





Resource Concerns

Major resource concerns in the area include:

- erosion
- degradation of stream quality
- conversion of nonurban land to urban
- degradation of soil quality

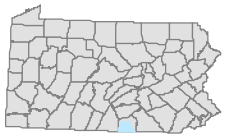
Conservation Practices

Common conservation practices for cropland:

- crop rotation
- contour farming
- residue management
- stripcropping
- riparian forest buffers
- cover crops
- diversions
- grassed waterways
- field borders
- terraces

Common pasture management practices:

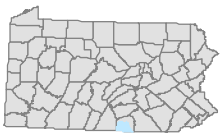
- prescibed grazing
- nutrient management
- pest management



PRS Performance Measures[16]

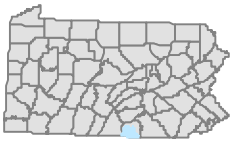
	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
Total Conservation Systems Planned (acres)	2420	10,605	652	2302	1823	NA	1312	1878	20,992
Total Conservation Systems Applied (acres)	1025	5569	502	1791	744	NA	1324	1587	12,542
Key Conservation Treatments									
Waste Storage Facility (number)	9	27	9	3	1	0	1	5	55
Riparian Forest Buffer (acres)	31	147	60	61	113	0	46	27	485
Erosion Control Total Soils Saved (tons/year)	400	3194	232	560	131	NA	NA	NA	4,517
Nutrient Management (acres)	158	2325	969	540	0	58	185	475	4,710
Pest Management (acres)	0	0	0	60	14	58	599	375	1,106
Prescribed Grazing (acres)	124	461	0	323	0	0	235	36	1,179
Tree and Shrub Establishment (acres)	3	0	0	28	3	0	20	0	54
Residue Management (acres)	110	1961	56	246	24	58	897	262	3,614
Wildlife Habitat (acres)	10	93	64	133	423	0	15	8	746
Wetlands Created, Restored, or Established	1	4	30	13	0	0	13	0	61
Acres in Conservation Programs									
Conservation Technical Assistance									
Planned	2256	10,215	491	116	498	NA	1201	1198	15,975
Applied	864	5424	396	698	171	NA	1032	741	9,326
Conservation Reserve Program									
Planned	0	0	55	316	1069	NA	120	169	1,729
Applied	0	0	0	41	536	NA	185	142	904
Environmental Quality Incentive Program									
Planned	933	2197	411	1726	157	NA	708	177	6,309
Applied	269	670	458	930	33	NA	161	582	3,103
Farmland Protection Policy/Farm and Ranch Lands Protection Program									
Planned	151	0	0	100	0	NA	0	0	251
Applied	126	0	0	81	0	NA	0	0	207
Forestry Incentive Program									
Planned	0	0	0	0	0	NA	0	0	0
Applied	0	0	0	0	0	NA	0	0	0
Grasslands Reserve Program									
Planned				0	56	NA	0	0	56
Applied				0	0	NA	0	0	0
Grazing Lands Conservation Initiative									
Planned	328	390	0						718
Applied	59	145	0						204
Wildlife Habitat Incentive Program									
Planned	0	383	0	0	0	NA	0	0	383
Applied	0	73	0	0	0	NA	0	0	73
Wetlands Reserve Program									
Planned	0	8	0	0	0	NA	0	0	8
Applied	0	8	0	0	0	NA	13	0	21

NA - Reporting was unavailabel by Hydrologic Unit Code



Social and Census Data[17]

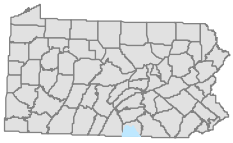
	Adams	Franklin	Total
Farms (number)	542	4	546
Land in farms (acres)	77,865	734	78599
Total cropland (acres)	58,067	573	58640
Principal operator by primary occupation - Farming (number)	300	3	303
Farms by Size			
1 to 9 acres	48	0	48
10 to 49 acres	219	1	220
50 to 179 acres	170	2	172
180 to 499 acres	70	1	71
500 to 999 acres	27	0	27
1,000 acres or more	8	0	8
Livestock and Poultry			
Cattle and calves inventory (farms)	191	3	194
Cattle and calves inventory - Beef cows (farms)	116	1	117
Cattle and calves inventory - Milk cows (farms)	26	1	27
Hogs and pigs inventory (farms)	28	0	28
Sheep and lambs inventory (farms)	24	0	24
Layers 20 weeks old and older inventory (farms)	40	0	40
Broilers and other meat-type chickens sold (farms)	4	0	4
Crops Harvested			
Corn for grain (acres)	8732	58	8790
Corn for silage or greenchop (acres)	3763	156	3919
Wheat for grain, all (acres)	5906	23	5929
Oats for grain (acres)	268	4	272
Barley for grain (acres)	535	18	553
Soybeans for beans (acres)	6524	42	6566
Forage - land used for all hay and all haylage, grass silage, and greenchop (acres)	17,492	205	17697
Vegetables harvested for sale (acres)	202	2	204
Land in orchards (acres)	7404	12	7416
Total cropland harvested (acres)	49,916	495	50411
Farm Operator by Ethnicity			
White	804	6	810
Black or African American	1	0	1
Asian	2	0	2
Hispanic	5	0	5
American Indian/Alaskan Native	2	0	2
Pacific Islander	0	0	0
Women	217	2	219



Partnership Groups:

A cooperative project involving NRCS and conservation partners, including:

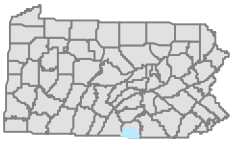
- State Conservation Commission
- Pennsylvania Department of Environmental Protection
- Pennsylvania Game Commission
- Pennsylvania Grazing/Forage Lands Conservation Coalition
- Pennsylvania Fish & Boat Commission



Footnotes/Bibliography

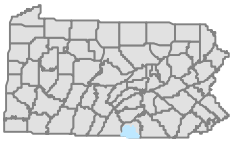
All data is provided "as is". There is no warranties, express or implied, including the warranty of fitness for a particular purpose, accompanying this document. Use for planning purpose only.

1. Common Resource Area
   Common Resource Area (CRA) delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. More information can be found online at http://soils.usda.gov/survey/geography/cra.html
2. National Elevation Dataset (NED)
   The NED is a seamless mosaic of the best-available elevation data. The primary source data were the USGS 7.5-minute (30-meter or 10-meter resolution) DEM's. A hillshade grid was also created using the DEM and used to creare a 3-D effect. More inforamtion on NED can be found online at http://ned.usgs.gov/
3. Land Use / Land Cover 2001
   Land Use / Land Cover map was created using the National Land Cover Dataset. The National Land Cover Dataset was compiled from Landsat satellite TM imagery with a spatial resolution of 30 meters and supplemented by various ancillary data (where available). More inforamtion can be found online at http://landcover.usgs.gov/
4. Average Annual Precipitation
   The average annual precipitation data for this map layer were produced through a partnership between NRCS and the Spatial Climate Analysis Service at Oregon State University (OSU). The average annual precipitation is from 1961 through 1990. More information can be found online at http://www.ncgc.nrcs.usda.gov/products/datasets/climate/index.html
5. National Wetlands Inventory (NWI)
   The NWI maps do not show all wetlands since the maps are derived from aerial photointerpretation with varying limitations due to scale, photo quality, inventory techniques, and other factors. More information can be found online at http://www.fws.gov/nwi/
6. Impaired Streams
   Impaired Streams were derived from Pennsylavania Department of Protection Office of Water Management, 2006 list on Non-Attaining Streams. More information can be found on DEP website at http://www.depweb.state.pa.us/dep/site/default.asp
7. Water Quality Testing Points
   Water Quality Testing Points monitor water quality with emphasis on stream acidity in Pennsylvania with an assoiciated database. The database contains more than 33,466 records on water quality from 1986 to the present from 622 testing sites throughout Pennsylvania. Information in the records includes alkalinity and Ph and includes nitrates and phosphates for some sites since 1996.
   The information is maintained by the Alliance for Aquatic Resource Monitoring. More information can be found online at http://alpha.dickinson.edu/storg/allarm/allarm%20projects/database.htm
8. Exceptional Value and High Quality Streams
   Exceptional Value and High Quality Streams were taken from the Chapter 93 data layer received from Pennsylvania Department of Environmental Protection. For more information on what qualifies a stream as exceptional value or high quality or any information on Chapter 93 streams go to http://www.pacode.com/secure/data/025/chapter93/chap93toc.html



Footnotes/Bibliography

9. Pennsylvania Trout Waters
   Pennsylvania Trout Water data is compiled by the Pennsylvania Fish and Boat Commission. This layer was created based on the 1:24000 National Hydropahy Dataset (NHD) water bodies layer. More information can be found online at http://www.fish.state.pa.us/fishpub/summary/troutwaters.html
10. Water Resource Points
    A Water Resource is a DEP primary facility type related to the Water Use Planning Program. More information can be found http://www.depweb.state.pa.us/dep/site/default.asp
11. Natural Heritage Inventory Sites
    The Natural Areas polygons were developed by the Pennsylvania Natural Heritage Program (PNHP) County Natural Heritage Inventory (CNHI) Program. Natural Areas were identified using map and air photo interpretation, aerial rconnaissance, and field surveys. More information and county reports can be found online at http://www.naturalheritage.state.pa.us/
12. Pennsylvania Breeding Bird Atlas
    Data was taken for the 1st Pennsylvania Breeding Bird Atlas (1992). For this watershed assessment, fourteen bird species were chosen to be focused on. More information about all bird species can be obtained at http://www.carnegiemnh.org/atlas/home.htm
13. Important Bird Areas
    The Important Bird Areas Program (IBA) is a global effort to identify and conserve areas that are vital to birds and other biodiversity. For more information nationally and/or on the state level go to http://www.audubon.org/bird/iba/
14. Important Mammal Areas
    Important Mammal Areas Project, IMAP, the first program of it's kind, was created by the Mammal Technical Committee of the Pennsylvania Biological Survey (PaBS). For more inforamtion go online to http://www.pawildlife.org/imap.htm



Footnotes/Bibliography

15. Soils
    Soil Survey spatial and tabular data were used for the following survey areas:
    Adams County (PA001)
    Franklin County (PA055)
    Spatial and tabular data an be downloaded at http://soildatamart.nrcs.usda.gov/
16. Performance Results System (PRS)
    PRS data was extracted from PRS by year, conservation system, conservation practice, and proagrams by hydrologic unit code. More information can be found online at the PRS homepage http://ias.sc.egov.usda.gov/prshome/
17. Social and Census Data
    Ag census data and ethnicity data were downloaded from the National Agricultural Statistics Service (NASS). The data was adjusted by percent of Hydrologic unit in the county. More inforamtion can be found online at http://www.nass.usda.gov/Census_of_Agriculture/index.asp